

## CLAIMS

1. A discharge lamp lighting apparatus comprising:  
a DC power supply for supplying power to a discharge lamp;  
a transformer for transmitting voltage of the DC power supply to the discharge lamp;  
a power supply switching element connected between the DC power supply and a primary winding of the transformer; and  
a first switching element and a second switching element that are connected to a primary side of the transformer,  
wherein the power supply switching element, the first switching element, and the second switching element are opened or closed to intermittently supply power from the DC power supply to the transformer to circulate a current through the primary side of the transformer even when the power is not supplied to the transformer.

2. The discharge lamp lighting apparatus according to claim 1, wherein when the power supply switching element is turned on, either the first switching element or the second switching element is turned on to supply power from the DC power supply, and wherein when the power supply switching element is turned off, the first switching element and the second switching element are turned on at the same time to pass a current through the primary side of the transformer and to pass a current through the whole circuit on a secondary side of the transformer.

3. The discharge lamp lighting apparatus according to claim 1, wherein timings when the power supply switching element is turned on and off are determined on the basis of a period of a

current passing through a secondary winding of the transformer.

4. The discharge lamp lighting apparatus according to claim 1, wherein timings when the power supply switching element is turned on and off are determined on the basis of a period of a load current or a load power of a secondary winding of the transformer.

5. The discharge lamp lighting apparatus according to claim 1, wherein timings when the power supply switching element is turned on and off are determined on the basis of a period of a current passing through the first switching element and the second switching element.

6. The discharge lamp lighting apparatus according to claim 2, wherein at the time of cold start, when the power supply switching element is turned on after a time period of discharge growth, either the first switching element or the second switching element is turned on to supply power from the DC power supply, and when the power supply switching element is turned off, the first switching element and the second switching element are turned on at the same time to pass a current through the primary side of the transformer and to pass a current through the whole circuit on the secondary side of the transformer and then to shift the discharge lamp to a steady state.

7. The discharge lamp lighting apparatus according to claim 1, further comprising:

a first inductance element connected in series to a secondary winding of the transformer;

a series resonance circuit connected to a secondary side of the transformer and including a second inductance element and a first capacitor; and

a parallel resonance circuit connected to the secondary side of the transformer and including a third inductance element and a second capacitor,

wherein any two of the first to the third capacitors are formed of a same core.

8. The discharge lamp lighting apparatus according to claim 7, wherein the first inductance element is formed of a leakage inductance of the secondary winding of the transformer.

9. The discharge lamp lighting apparatus according to claim 1, wherein a capacity of the first capacitor is not less than a capacity of the second capacitor.

10. The discharge lamp lighting apparatus according to claim 1, wherein the transformer is a push-pull transformer.